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(54) 【発明の名称】 表面保護フィルム

(57) 【要約】

【課題】 透過性が高く、被着体の汚染の少ない帯電防止効果の高い表面保護フィルムを提供する。

【解決手段】 ポリエチレンやポリプロピレン等の合成樹脂100重量部に、ポリエーテルエステルアミド1～100重量部を含有させて基材層を成形し、当該基材層にアクリル系粘着剤やエチレン-アクリル酸エステル系粘着剤などからなる粘着剤層を積層して、本発明に係る表面保護フィルムを作製する。

【特許請求の範囲】

【請求項1】 合成樹脂からなる基材層に粘着剤層を積層した再剥離性の表面保護フィルムにおいて、前記基材層にポリエーテルエステルアミドを含有させたことを特徴とする表面保護フィルム。

【請求項2】 前記基材層の合成樹脂100重量部に、ポリエーテルエステルアミド1～100重量部を含有した請求項1に記載の表面保護フィルム。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は表面保護フィルムに関する。具体的には、液晶パネルや偏光板、プラスチック樹脂板の加工時や輸送時あるいは保管時に、これらの表面を保護するために用いられる帯電防止機能を有する再剥離性の表面保護フィルムに関する。

【0002】

【従来の技術】パーソナルコンピュータやワードプロセッサ、電子卓上計算機等の液晶パネルや偏光板の加工時における傷付きやゴミの付着、汚染などを防止するために、合成樹脂製の再剥離性がある表面保護フィルムを液晶パネルや偏光板に貼って保護することが行なわれている。

【0003】しかしながら、従来の表面保護フィルムは、絶縁体である合成樹脂から作製されているため、保護する役割を終えた後に液晶パネル等から剥離する際に静電気が発生し、その結果、電子回路のICが破損されたり、ゴミやほこりが付着するなどの問題があり、表面保護フィルムに帯電防止機能を付与する必要がある。

【0004】この一つの手法として、表面保護フィルムを構成する基材層若しくは粘着剤層に導電性フィラーや界面活性剤などの帯電防止剤を練り込む方法があるが、導電性フィラーを練り込んだものは透明性が悪く、表面保護フィルムを貼り付けた状態では、被着体面を目視で確認することが困難であった。また、目標とする帯電防止効果を得るためには、大量の導電性フィラーを添加しなければならず、大幅な製造コストのアップにもつながっていた。

【0005】一方、界面活性剤などの帯電防止剤を練り込んだものは、帯電防止剤が表面保護フィルムの表面にブリードアウトし、そこから静電気を逃がすことによって帯電防止効果を生じるが、界面活性剤は一般に低分子量のものが多く、ブリードアウト量が安定せず、帯電防止効果や粘着特性が変化したりするため、一定の品質の表面保護フィルムを得ることが困難であった。特に、ブリードアウト量が過剰になると、被着体を界面活性剤で汚染するという致命的な問題がある。

【0006】本発明は叙上の従来例の欠点に鑑みてなされたものであり、その目的とするところは、透過性が高く、被着体の汚染の少ない帯電防止効果の高い表面保護フィルムを提供することにある。

【0007】本発明者は、上記課題を解決すべく鋭意検討した結果、合成樹脂からなる基材層にポリエーテルエステルアミドを含有させることによって、基材層の機械的強度を低下させずに、含有したポリエーテルエステルアミドが表面から脱落して被着体を汚染することもなく、しかも安定した帯電防止性に優れた表面保護フィルムを得られることを見出し、本発明を完成するに至った。

【0008】

【課題を解決するための手段】本発明に係る表面保護フィルムは、合成樹脂からなる基材層に粘着剤層を積層した再剥離性の表面保護フィルムにおいて、前記基材層にポリエーテルエステルアミドを含有させたことを特徴としている。

【0009】本発明において、ポリエーテルエステルアミドとは、広く、反応性末端を有するポリアミドブロックと反応性末端を有するポリエーテルとの共重合生成物を意味し、ランダムポリエーテルエステルアミド、すなわち各種単量体成分のランダム連鎖により形成された重合体だけでなく、ブロックポリエーテルエステルアミド、すなわち、各種の成分が所定の鎖長を有するブロックにより形成された重合体をも意味するものである。

【0010】本発明に用いられるポリエーテルエステルアミドとしては、例えば、特開平1-163234号公報や特公平4-5691号公報、特開平7-188476号公報に開示されたものを用いることができる。

【0011】これらのうち、数平均分子量が200～5,000のポリアミドと、数平均分子量が300～5,000のビスフェノール類のアルキレンオキシド付加物及び／又はポリオキシアルキレングリコールから誘導されるポリエーテルエステルアミドが好ましく、特に両末端にカルボキシル基を有する数平均分子量200～5,000のポリアミドと数平均分子量300～5,000のビスフェノール類のアルキレンオキシド付加物から誘導されるポリエーテルエステルアミドが望ましい。

【0012】ポリアミドの数平均分子量が200未満のものは、ポリエーテルエステルアミドの耐熱性が悪くなり、基材層の作製に好ましくない。一方、数平均分子量が5,000を超えるものはポリエーテルエステルアミド自体を得ることが困難であり、安価に表面保護フィルムを得ることができない。また、ビスフェノール類のアルキレンオキシド付加物やポリオキシアルキレングリコールの数平均分子量が300未満のものは、帯電防止効果が不十分なものとなる。一方、数平均分子量が5,000を超えるものはポリエーテルエステルアミド自体を得ることが困難であり、安価に表面保護フィルムを得ることができない。

【0013】基材層に用いる合成樹脂としては、表面保護フィルムとして用いられるものであれば特に限定されるものではなく、例えば、ポリエチレン、ポリプロピレ

ン、ポリエステル、ポリ塩化ビニル、ポリアミド、エチレン/プロピレン共重合体、ポリスチレンなどの各種合成樹脂が挙げられ、これらのうち1種若しくは2種以上が用いられる。また、必要に応じてこれらの積層体を用いてもよい。

【0014】このとき、ポリエーテルエステルアミドは、上記合成樹脂100重量部に対し、1~100重量部で混合するのがよく、より好ましくは、5~50重量部である。1重量部未満の配合量であれば、ほとんど帯電防止効果を得られず、また、100重量部より多く配合しても、得られる基材層の機械的強度が十分でなく、帯電防止効果も向上せず経済的にも不利である。

【0015】基材層は、これらの合成樹脂に上記のポリエーテルエステルアミドを含有させて作製されるが、この基材層には、合成樹脂やポリエーテルエステルアミド以外に、帯電防止性を更に向上させる目的で、必要によりアルカリ金属及び/又はアルカリ土類金属のハロゲン化合物を含有させてもよい。また、公知の各種非イオン性、アニオン性、カチオン性若しくは両性の界面活性剤を混合することもできる。さらには、透明性や帯電防止性その他表面保護フィルムとしての機能を低下させない範囲で、その使用目的に応じてその他通常の基材層中に添加させることができる、例えば、顔料、染料、可塑剤、酸化防止剤、紫外線吸収剤、スリッパ剤などを添加してもよい。

【0016】基材層を形成するには、合成樹脂とポリエーテルエステルアミドを上記範囲の配合比となるように混合するが、このとき、合成樹脂とポリエーテルエステルアミドを一括に混練して基材層を作製する方法と、合成樹脂の一部とポリエーテルエステルアミドと予め混練した後、残りの合成樹脂を混練する、いわゆるマスターバッチまたはマスターペレットと呼ばれる方法とがある。一般には、ポリエーテルエステルアミドを均一に混合できる観点から、マスターバッチまたはマスターペレットを経由するのが好ましい。このマスターバッチまたはマスターペレットとしては、例えば、三洋化成工業(株)から商品名「ベレスタットシリーズ」として供給される。つまり、このマスターバッチ(マスターペレット)と基材層を形成する合成樹脂とを上記の混合比となるように混合し、常法によってシート状の基材層を得ることができる。また、上述したようにこのマスターバッチまたはマスターペレットに用いられた合成樹脂と混合する残りの合成樹脂とは異なるものを用いても差し支えない。

【0017】本発明の表面保護フィルムに使用される粘着剤は、液晶パネルのパネル面等に糊のこりや汚染がなく再剥離可能に粘着できる特性を有するものであれば、特に限定されるものではない。例えば、アクリル系、天然ゴム系、合成ゴム系、エチレン-酢酸ビニル共重合体系、エチレン-アクリル酸エステル系、スチレン-イソ

ブレンブロック共重合体系、スチレン-ブタジエンブロック共重合体系などの各種粘着剤が挙げられ、これらの1種若しくは2種以上を用いることができる。

【0018】粘着剤層を基材層に積層する方法としても特に限定されず、任意の方法が採用されるが、例えば、基材層の片面にコロナ放電処理して、上記の粘着剤溶液を塗布することができる。また、粘着剤溶液中には、必要に応じて、各種の帯電防止剤、スリッパ剤、酸化防止剤その他通常の表面保護フィルムの粘着剤中に用いられる各種添加剤を加えることができる。

【0019】また、本発明の表面保護フィルムにおいて、基材層及び粘着剤層の厚さはそれぞれ用途によって適宜決定されるが、基材層の厚さは一般に10~100 μm 、好ましくは30~70 μm である。また、粘着剤層の厚さは一般に1~50 μm 、好ましくは3~15 μm である。

【0020】

【実施例】次に、本発明の実施例である表面保護フィルムと比較例である表面保護フィルムを各種作製し、本発明の効果を確認した。なお、以下において、「%」及び「部」はそれぞれ、「重量%」及び「重量部」を意味する。また、本発明はこれらの各実施例に限定されるものではない。

【0021】(実施例1) MFR(メルトフローレート、JIS K7210「熱可塑性プラスチックの流れ試験方法」による。以下同じ。)3.0、密度0.92 g/cm^3 の低密度ポリエチレン70%と、ポリエーテルエステルアミドを含有したマスターペレット(ポリエーテルエステルアミド含有、三洋化成工業(株)社製、ポリエチレン系樹脂用練り込み帯電防止剤ベレスタット2150)30%をドライブレンドした後、T形ダイス押出成形機(40mm ϕ)にて樹脂温度190℃で押し出し、厚さ60 μm のフィルムに成形した。成形性は良好で、得たフィルムの外観も良好であった。

【0022】上記で得たフィルムの片面にコロナ放電処理を施し、その処理面にアクリル酸ブチル/アクリル酸=95/5(重量比)の共重合ポリマー100部に対してテトラグリシジル-1、3-ビスアミノメチルシクロヘキサン3部を添加してなるアクリル系粘着剤を、塗布膜が固形分で5 μm となるように塗布した後、乾燥器にて80℃2分間乾燥して、実施例1の表面保護フィルムを得た。

【0023】(実施例2) MFR3.0、密度0.92 g/cm^3 の低密度ポリエチレン70%と実施例1で用いたポリエーテルエステルアミドを含有したマスターペレット30%をドライブレンドした混合物を基材層構成樹脂として、また、MFR4.0、密度0.95 g/cm^3 の酢酸ビニル11%含有エチレン-酢酸ビニル共重合体を粘着剤層構成樹脂として用い、二層共押出法により、実施例2の表面保護フィルムを得た。なお、このも

の厚さは60 μ mであり、基材層厚さは45 μ m、粘着剤層厚さは15 μ mであった。

【0024】(実施例3) MFR9.0、密度0.90 g/cm³のポリプロピレン80%と、ポリエーテルエステルアミドを含有したマスターベレット(ポリエーテルエステルアミド含有、三洋化成工業(株)社製、ポリプロピレン系樹脂用練り込み帯電防止剤ベレスタット3170)20%をドライブレンドした後、T形ダイス押出成形機(40mm ϕ)にて樹脂温度230℃で押し出し、厚さ40 μ mのフィルムに成形した。成形性は良好で、得たフィルムの外観も良好であった。この後、実施例1と同様にして粘着剤層を積層し、実施例3の表面保護フィルムを得た。

【0025】(実施例4) MFR9.0、密度0.90 g/cm³のポリプロピレン70%とMFR3.0、密度0.92 g/cm³の低密度ポリエチレン10%及び実施例3で用いたポリエーテルエステルアミドを含有したマスターベレット20%をドライブレンドした後、T形ダイス押出成形機(40mm ϕ)にて樹脂温度230℃で押し出し、厚さ40 μ mのフィルムに成形した。成形性は良好で、得たフィルムの外観も良好であった。この後、実施例1と同様にして粘着剤層を積層し、実施例4の表面保護フィルムを得た。

【0026】(比較例1) MFR3.0、密度0.92 g/cm³の低密度ポリエチレン90%と非イオン界面活性剤型帯電防止剤(三洋化成工業(株)ケミスタット1100)10%をドライブレンドした後、T形ダイス押出成形機(40mm ϕ)にて樹脂温度190℃で押し出し、厚さ60 μ mのフィルムに成形した。成形性は良好であったが、フィルム表面に多少のベタツキが見られた。この後、実施例1と同様にして同様に粘着剤層を積層し、比較例1の表面保護フィルムを得た。

【0027】(比較例2) MFR3.0、密度0.92 g/cm³の低密度ポリエチレンを、T形ダイス押出成形機(40mm ϕ)にて樹脂温度190℃で押し出し、厚さ60 μ mのフィルムに成形した。この後、実施例1と同様にして同様に粘着剤層を積層し、比較例2の表面保護フィルムを得た。

【0028】(比較例3) MFR9.0、密度0.92 g/cm³の低密度ポリエチレンを、T形ダイス押出成形機(40mm ϕ)にて樹脂温度230℃で押し出し、厚さ40 μ mのフィルムに成形した。この後、実施例1と同様にして同様に粘着剤層を積層し、比較例3の表面保護フィルムを得た。

【0029】〔特性試験〕上記で得た実施例1~4及び比較例1~3の各表面保護フィルムについて、以下の各試験を行なった。特性試験としては、粘着力、外観、被着体への汚染性、電気特性(表面抵抗率、剥離帯電圧)、力学特性(弾性率、破断強度)について測定し

た。

【0030】(粘着力) 各表面保護フィルムを20mm幅にカットし、アクリル樹脂板(三菱レイヨン(株)社製「アクリライトL」、以下同じ。)に2kgfのローラを1往復させて貼付し、30分後に引張速度300mm/分、剥離角度180°の条件で引張試験機にて測定した。

【0031】(外観) 表面保護フィルムについて、帯電防止剤が練り込まれていない比較例2及び3のフィルムと大きな差がないかどうか評価した。透明性が損われることなく、また、帯電防止剤のブリードアウトによる表面のベタツキがない場合には○とし、フィルムの着色又は帯電防止剤のブリードアウトによる表面のベタツキがある場合には×として、評価した。

【0032】(被着体への汚染性) 各表面保護フィルムを20mm幅にカットし、アクリル樹脂板に2kgfのローラを1往復させて貼付し、50℃、24時間保存後、手で剥離させたアクリル樹脂板に汚染がないかどうか目視により評価した。アクリル樹脂板に汚染がなかった場合には○とし、汚染があった場合には×として評価した。

【0033】(電気特性)

①表面抵抗率

JIS K6911「熱硬化性プラスチック一般試験方法」に規定の方法に準じ、25℃、湿度65%R.H.の雰囲気下で、基材層表面及び粘着剤層表面それぞれについて測定した。

②剥離帯電圧

70mm×100mmの大きさのアクリル樹脂板に貼り付けられた液晶ディスプレイ用偏光フィルムの表面に各表面保護フィルムを貼り付け、その後貼り付けた表面保護フィルムを手で剥離させて、その時に当該偏光フィルムに帯電した帯電電位を集電式電位測定器(春日電気社製 KS-471型)により、25℃、湿度65%R.H.の雰囲気下で測定した。

【0034】(力学特性)

表面保護フィルムを20mm幅にカットし、引張試験器を用いて、チャック間距離50mm、引張速度300mm/分で引張試験を行なった。

①弾性率

上記引張試験による応力-ひずみ曲線の初期の接線の傾きより求めた。

②破断強度

上記引張試験によるフィルム破断時の強度より求めた。

【0035】上記各特性試験の結果を、表1にまとめた。

【0036】

【表1】

	粘着力 (gf/20mm)	外 観	被 着 体 への 汚 染 性	電 気 特 性			力 学 特 性	
				表 面 抵 抗 率		剥離帯電圧 (kV)	弾 性 率 (kgf/mm ²)	破 断 強 度 (kgf/mm ²)
				フィルム面 (Ω/□)	糊 面 (Ω/□)			
実施例 1	50	○	○	3×10 ¹⁰	3×10 ¹¹	-2.0	16	2.0
実施例 2	5	○	○	1×10 ¹⁰	2×10 ¹¹	-2.0	15	2.1
実施例 3	45	○	○	7×10 ¹⁰	3×10 ¹¹	-2.0	65	3.9
実施例 4	40	○	○	4×10 ¹¹	7×10 ¹¹	-1.5	55	3.2
比較例 1	30	×	×	1×10 ¹¹	1×10 ¹¹	-2.5	15	2.0
比較例 2	50	○	○	5×10 ¹⁰	3×10 ¹¹	-8.5	17	2.1
比較例 3	5	○	○	5×10 ¹⁰	2×10 ¹¹	-7.5	12	1.8

【0037】表1からも分かるように、実施例の表面保護フィルムはいずれも、透明性や外観もよく、被着体への汚染もなかった。また、粘着力についても実施例2の表面保護シートでは低いものであったが、実際上の粘着性については問題がなく、基材層に含有させたポリエーテルエステルアミドによる影響はなかった。さらに、電気的特性についても、界面活性剤を混練させた場合と同様にあるいはそれ以上に表面抵抗率を低下させ、剥離帯電圧についても効果的に低下させることができた。また、力学特性についても、ポリエーテルエステルアミドによる影響はなく、十分な機械的強度を有する表面保護フィルムを得ることができた。

【0038】

【発明の効果】本発明の表面保護フィルムによれば、合成樹脂からなる基材層に粘着剤層を積層した再剥離性の

表面保護フィルムにおいて、前記基材層にポリエーテルエステルアミドを含有させたことを特徴としているので、機械的強度や透明性が高く、被着体の汚染の少ない帯電防止効果の高い表面保護フィルムとすることができ

る。【0039】したがって、保護表面フィルムの貼付けや剥離作業時に静電気が発生せず、液晶パネルや偏光板近くの回路に組込まれたICが静電気によって破壊されることを防止できる。また、ゴミやほこりが付着せず商品価値の低下を防止でき、帯電防止剤のブリードアウトによる汚染も防ぐことができる。さらに、透明性が高いために表面保護フィルムを貼着したままでも加工しやすく、被着体表面を容易に目視確認できる。このように本発明にあっては、加工時や輸送時、保管に有効な優れた表面保護フィルムを提供できる。

PATENT ABSTRACTS OF JAPAN

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(71)Applicant : NITTO DENKO CORP

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(72)Inventor : TAKADA SHINICHI

(54) SURFACE PROTECTIVE FILM

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a surface protective film having high transmission properties, small contamination of material to be covered and high anti-static effect.

SOLUTION: This surface protective film comprises a base material layer molded by incorporating 1 to 100 pts.wt. of polyetheresteramide in 100 pts.wt. of synthetic resin such as polyethylene or polypropylene. An Adhesive used for the film is not particularly limited if the adhesive has characteristics of rereleasably adhering to a surface of a liquid crystal panel without paste residue or contamination. For example, the adhesive layer made of acrylic adhesive or ethylene-acrylic acid ester adhesive is laminated on the material layer.

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CLAIMS

[Claim(s)]

[Claim 1] The surface-protection film characterized by making said base material layer contain a polyether ester amide in the surface-protection film of the removability which carried out the laminating of the binder layer to the base material layer which consists of synthetic resin.

[Claim 2] The surface-protection film according to claim 1 which contained the polyether ester amide 1 - the 100 weight sections in the synthetic-resin 100 weight section of said base material layer.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to a surface-protection film. It is related with the surface-protection film of the removability which has the antistatic function in which it is specifically used at the time of processing of a liquid crystal panel, a polarizing plate, and a plastic resin plate, transport, or storage in order to protect these front faces.

[0002]

[Description of the Prior Art] In order to prevent adhesion of liquid crystal panels, such as a personal computer, and a word processor, an electronic calculator, and a blemish and the dust at the time of processing of a polarizing plate, contamination, etc., sticking a surface-protection film with the removability made of synthetic resin on a liquid crystal panel or a polarizing plate, and protecting it is performed.

[0003] However, since the conventional surface-protection film was produced from the synthetic resin which is an insulator, in case it exfoliates from a liquid crystal panel etc. after finishing the role to protect, static electricity occurs, consequently IC of an electronic circuitry is damaged, or it has the problem of dust and dust adhering, and needed to give the antistatic function to the surface-protection film.

[0004] Although the method of scouring antistatic agents, such as a conductive filler and a surfactant, was in the base material layer or binder layer which constitutes a surface-protection film as this one technique, what scoured the conductive filler had bad transparency, and it was difficult to check an adherend side visually, where a surface-protection film is stuck. Moreover, in order to acquire the target antistatic effectiveness, the conductive filler of a large quantity had to be added and it had led also to the rise of a large manufacturing cost.

[0005] Although the antistatic effectiveness was produced by an antistatic agent's, carrying out bleed out of what scoured antistatic agents, such as a surfactant, to the front face of a surface-protection film on the other hand, and missing static electricity from there, generally the surfactant had many things of low molecular weight, and since the amount of bleed out was not stabilized but the antistatic effectiveness and an adhesion property changed, it was difficult [it] to obtain the surface-protection film of fixed quality. When the amount of bleed out becomes superfluous especially, there is a fatal problem of polluting adherend with a surfactant.

[0006] The place which this invention is made in view of the fault of the above-stated conventional example, and is made into the object has high permeability, and is to offer the high surface-protection film of the antistatic effectiveness with little contamination of adherend.

[0007] Without the contained polyether ester amide having dropped out of the front face, and polluting adherend, without reducing the mechanical strength of a base material layer by making the base material layer which consists of synthetic resin contain a polyether ester amide, as a result of inquiring wholeheartedly that the above-mentioned technical problem should be solved, this invention person finds out that the surface-protection film excellent in the antistatic nature moreover stabilized can be obtained, and came to complete this invention.

[0008]

[Means for Solving the Problem] The surface-protection film concerning this invention is

characterized by making said base material layer contain a polyether ester amide in the surface-protection film of the removability which carried out the laminating of the binder layer to the base material layer which consists of synthetic resin.

[0009] In this invention, a polyether ester amide is large, means the copolymerization product of the polyamide block which has a reactant end, and the polyether which has a reactant end, and means, not only the polymer formed of the random chain of a random polyether ester amide, i.e., various monomer components, but a block polyether ester amide, i.e., the polymer in which various kinds of components were formed by the block which has predetermined chain length.

[0010] As a polyether ester amide used for this invention, what was indicated by JP,1-163234,A, JP,4-5691,B, and JP,7-188476,A can be used, for example.

[0011] The polyether ester amide to which number average molecular weight is guided among these from the alkylene oxide addition product of the bisphenols of the polyamide of 200-5,000, the polyamide of the number average molecular weight 200-5,000 which the polyether ESUERU amide to which number average molecular weight is guided from the alkylene oxide addition product and/or polyoxy alkylene glycol of bisphenols of 300-5,000 is desirable, and has a carboxyl group especially in both ends, and number average molecular weight 300-5,000 is desirable.

[0012] The thermal resistance of a polyether ester amide worsens and less than 200 thing does not have the desirable number average molecular weight of a polyamide to production of a base material layer. On the other hand, that to which number average molecular weight exceeds 5,000 is difficult to obtain the polyether ester amide itself, and cannot obtain a surface-protection film cheaply. Moreover, the number average molecular weight of the alkylene oxide addition product of bisphenols or polyoxy alkylene glycol becomes what has the antistatic effectiveness inadequate [less than 300 thing]. On the other hand, that to which number average molecular weight exceeds 5,000 is difficult to obtain the polyether ester amide itself, and cannot obtain a surface-protection film cheaply.

[0013] As synthetic resin used for a base material layer, especially if used as a surface-protection film, it is not limited, and various synthetic resin, such as polyethylene, polypropylene, polyester, a polyvinyl chloride, a polyamide, ethylene/propylene copolymer, and polystyrene, is mentioned, for example, one sort or two sorts or more are used among these. Moreover, these layered products may be used if needed.

[0014] At this time, it is 5 - 50 weight section often [a polyether ester amide / mixing in the 1 - 100 weight section to the above-mentioned synthetic-resin 100 weight section], and more preferably. If it is the loadings of under 1 weight section, even if it can hardly acquire the antistatic effectiveness and blends mostly from the 100 weight sections, it is not enough, and the mechanical strength of antistatic effectiveness of the base material layer obtained does not improve, but is economically disadvantageous.

[0015] Although a base material layer makes these synthetic resin contain the above-mentioned polyether ester amide and is produced, it is the object which raises antistatic nature further, and may make this base material layer contain the halogenated compound of alkali metal and/or alkaline earth metal as occasion demands in addition to synthetic resin or a polyether ester amide. Moreover, the surfactant of various well-known nonionic one, anionic, cationicity, or both sexes is also mixable. Furthermore, the pigment which can respond in activity eye and can be made to add in the usual base material layer in addition to this, a color, a plasticizer, an antioxidant, an ultraviolet ray absorbent, a slipping agent, etc. may be added in the range in which the function as transparency or another antistatic nature and surface-protections film is not reduced.

[0016] In order to form a base material layer, synthetic resin and a polyether ester amide are mixed so that it may become the compounding ratio of the above-mentioned range, but after kneading beforehand with the approach of kneading synthetic resin and a polyether ester amide to a package, and producing a base material layer at this time, some synthetic resin, and a polyether ester amide, there is an approach called the so-called masterbatch or master pellet which kneads the remaining synthetic resin. It is desirable to go via a masterbatch or a master

masterbatch or a master pellet, it is supplied as a trade name "PERESUTATTO series" from Sanyo Chemical Industries, Ltd., for example. That is, this masterbatch (master pellet) and the synthetic resin which forms a base material layer can be mixed so that it may become the above-mentioned mixing ratio, and a sheet-like base material layer can be obtained with a conventional method. Moreover, as mentioned above, even if it uses a different thing from the remaining synthetic resin mixed with the synthetic resin used for this masterbatch or a master pellet, it does not interfere.

[0017] The binder used for the surface-protection film of this invention will not be especially limited, if it has the property which there are no stiffness and contamination of a paste in the panel side of a liquid crystal panel etc., and can adhere to it possible [re-exfoliation]. For example, various binders, such as acrylic, a natural rubber system, a synthetic-rubber system, an ethylene-vinylacetate copolymer system, an ethylene-acrylic ester system, a styrene-isoprene block-copolymer system, and a styrene-butadiene block-copolymer system, are mentioned, and these one sort or two sorts or more can be used.

[0018] Although it is not limited especially as an approach of carrying out the laminating of the binder layer to a base material layer but the approach of arbitration is adopted, corona discharge treatment can be carried out to one side of a base material layer, and the above-mentioned binder solution can be applied, for example. Moreover, into a binder solution, the various additives used into various kinds of antistatic agents, a slipping agent, and the binder of an antioxidant and others usual surface-protection film can be added if needed.

[0019] Moreover, in the surface-protection film of this invention, although the thickness of a base material layer and a binder layer is suitably determined by the application, respectively, generally 10-100 micrometers of thickness of a base material layer are 30-70 micrometers preferably. Moreover, generally 1-50 micrometers of thickness of a binder layer are 3-15 micrometers preferably.

[0020]

[Example] Next, various production of the surface-protection film which is the example of this invention, and the surface-protection film which is an example of a comparison was carried out, and the effectiveness of this invention was checked. In addition, "%" and the "section" mean "% of the weight" and the "weight section" below, respectively. Moreover, this invention is not limited to each of these examples.

[0021] (Example 1) MFR (based on the flow test approach of a melt flow rate and JIS K7210 "thermoplastics".) It is below the same. After carrying out the dryblend of the master pellet (polyether ester amide content, Sanyo Chemical Industries [, Ltd.], Ltd. make, kneading lump antistatic-agent PERESUTATTO 2150 for polyethylene system resin) 30% containing 3.0 and consistency 70% of low density polyethylene and the polyether ester amide of 3 of 0.92g/cm, it extruded with the resin temperature of 190 degrees C with T form dice extruding press machine (40mmphi), and fabricated on the film with a thickness of 60 micrometers. The moldability was good and its appearance of the obtained film was also good.

[0022] Corona discharge treatment was performed to one side of the film obtained above, after applying the acrylic binder which comes to add tetraglycidyl ether -1 and the 3-bis-aminomethyl cyclohexane 3 section to the processing side to the copolymerization polymer 100 section of butyl acrylate / acrylic-acid =95 / 5 (weight ratio) so that the spreading film may be set to 5 micrometers by solid content, 80 degrees C dried for 2 minutes with the oven, and the surface-protection film of an example 1 was obtained.

[0023] (Example 2) The surface-protection film of an example 2 was obtained by the bilayer co-extruding method by using as base material lamination resin mixture which carried out the dryblend of the master pellet 30% containing the polyether ester amide used in MFR3.0, and the consistency 70% of low density polyethylene and the example 1 of 3 of 0.92g/cm, using 11% content ethylene-vinylacetate copolymer of vinyl acetate of MFR4.0 and consistency 0.95 g/cm³ as binder lamination resin. In addition, the thickness of this thing was 60 micrometers and 45 micrometers and the binder layer thickness of base material layer thickness were 15 micrometers.

0.90 g/cm³, and the master pellet (polyether ester amide content, Sanyo Chemical Industries [, Ltd.], Ltd. make, kneading lump antistatic-agent PERESUTATTO 3170 for polypropylene resins) 20% containing a polyether ester amide, it extruded with the resin temperature of 230 degrees C with T form dice extruding press machine (40mmphi), and fabricated on the film with a thickness of 40 micrometers. The moldability was good and its appearance of the obtained film was also good. Then, the laminating of the binder layer was carried out like the example 1, and the surface-protection film of an example 3 was obtained.

[0025] (Example 4) After carrying out the dryblend of the master pellet 20% containing the polyether ester amide used in MFR9.0, and the consistency 10% of low density polyethylene and the example 3 of polypropylene 70% of 3, MFR3.0, and consistency 0.92 g/cm³ of 0.90g/cm, it extruded with the resin temperature of 230 degrees C with T form dice extruding press machine (40mmphi), and fabricated on the film with a thickness of 40 micrometers. The moldability was good and its appearance of the obtained film was also good. Then, the laminating of the binder layer was carried out like the example 1, and the surface-protection film of an example 4 was obtained.

[0026] (Example 1 of a comparison) After carrying out the dryblend of 90% of low density polyethylene and 10% (Sanyo Chemical Industries, Ltd. KEMISUTATTO 1100) of nonionic surface active agent mold antistatic agents of MFR3.0 and consistency 0.92 g/cm³, it extruded with the resin temperature of 190 degrees C with T form dice extruding press machine (40mmphi), and fabricated on the film with a thickness of 60 micrometers. Although the moldability was good, some smeariness was seen on the film front face. Then, the laminating of the binder layer was similarly carried out like the example 1, and the surface-protection film of the example 1 of a comparison was obtained.

[0027] (Example 2 of a comparison) The low density polyethylene of MFR3.0 and consistency 0.92 g/cm³ was extruded with the resin temperature of 190 degrees C with T form dice extruding press machine (40mmphi), and was fabricated on the film with a thickness of 60 micrometers. Then, the laminating of the binder layer was similarly carried out like the example 1, and the surface-protection film of the example 2 of a comparison was obtained.

[0028] (Example 3 of a comparison) The low density polyethylene of MFR9.0 and consistency 0.92 g/cm³ was extruded with the resin temperature of 230 degrees C with T form dice extruding press machine (40mmphi), and was fabricated on the film with a thickness of 40 micrometers. Then, the laminating of the binder layer was similarly carried out like the example 1, and the surface-protection film of the example 3 of a comparison was obtained.

[0029] [Characteristic test] Each following trial was performed about each surface-protection film of the examples 1-4 acquired above and the examples 1-3 of a comparison. As a characteristic test, it measured about adhesion, an appearance, the stain resistance to adherend, the electrical property (surface resistivity, exfoliation band electrical potential difference), and the dynamics property (an elastic modulus, breaking strength).

[0030] (Adhesion) Each surface-protection film was cut into 20mm width of face, the acrylic resin plate (it is the same the "bitter taste rewrite L" by Mitsubishi Rayon [Co., Ltd.] Co., Ltd. and the following.) was made to carry out 1 ***** of the rollers of 2kgf(s), they were stuck on it, and it measured with the tension tester after 30 minutes on a part for speed-of-testing/of 300mm, and conditions with an exfoliation include angle of 180 degrees.

[0031] (Appearance) It evaluated whether about a surface-protection film, there would be a film of the examples 2 and 3 of a comparison with which an antistatic agent is scoured, and a big difference. Without spoiling transparency, when there was no smeariness of the front face by the bleed out of an antistatic agent, it considered as O, and when there was smeariness of the front face by coloring of a film or the bleed out of an antistatic agent, it evaluated as x.

[0032] (Stain resistance to adherend) Each surface-protection film was cut into 20mm width of face, and the acrylic resin plate was made to carry out 1 ***** of the rollers of 2kgf(s), it stuck, and viewing estimated [whether there is any contamination in the acrylic resin plate made to exfoliate by the hand and] after 50 degrees C and 24-hour preservation. When there was no contamination in an acrylic resin plate, it considered as O, and when there was contamination, it

[0033] (Electrical property)

** Surface resistivity JIS According to the regular approach, it measured [to K6911 "the thermosetting plastic commercial-test approach"] about a base material layer front face and each binder layer front face under the ambient atmosphere of 25 degrees C and 65% [of humidity] R.H.

** The surface-protection film which stuck each surface-protection film on the front face of the polarization film for liquid crystal displays stuck on the acrylic resin plate of exfoliation band electrical-potential-difference 70mmx100mm magnitude, and was stuck after that was made to exfoliate by hand, and the electrification potential then charged on the polarization film concerned was measured under the ambient atmosphere of 25 degrees C and 65% [of humidity] R.H. with the current collection type potential measuring instrument (KS[by the Kasuga electrical-and-electric-equipment company]-471 mold).

[0034] (Dynamics property)

The surface-protection film was cut into 20mm width of face, and the tension test was performed using the tension test machine by part for distance [of 50mm] between chucks, and speed-of-testing/of 300mm.

** It asked from the inclination of the tangent in early stages of the stress-strain curve by the elastic-modulus above-mentioned tension test.

** It asked from the reinforcement at the time of the film fracture by the breaking strength above-mentioned tension test.

[0035] The result of each above-mentioned characteristic test was summarized in a table 1.

[0036]

[A table 1]

	粘着力 (gf/20mm)	外 観	被着体 への 汚 染 性	電 気 特 性			力 学 特 性	
				表 面 抵 抗 率		剥離帯電圧 (k V)	弾 性 率 (kgf/mm ²)	破 断 強 度 (kgf/mm ²)
				フィルム面 (Ω/□)	糊 面 (Ω/□)			
実施例 1	50	○	○	3×10^{10}	3×10^{12}	-2.0	16	2.0
実施例 2	5	○	○	1×10^{10}	2×10^{10}	-2.0	15	2.1
実施例 3	45	○	○	7×10^{10}	3×10^{11}	-2.0	65	3.9
実施例 4	40	○	○	4×10^{11}	7×10^{12}	-1.5	55	3.2
比較例 1	30	×	×	1×10^{11}	1×10^{10}	-2.5	15	2.0
比較例 2	50	○	○	5×10^{10}	3×10^{10}	-8.5	17	2.1
比較例 3	5	○	○	5×10^{10}	2×10^{10}	-7.5	12	1.8

[0037] As shown also in a table 1, each surface-protection film of an example of transparency or an appearance was also good, and did not have the contamination to adherend, either. Moreover, although it was low with the surface-protection sheet of an example 2 also about adhesion, about the adhesiveness on actual, it was satisfactory, and there was no effect by the polyether ester amide which the base material layer was made to contain. Furthermore, surface resistivity was able to be reduced more than it like [electrical characteristics] the case where a surfactant is made to knead, and it was able to be made to fall effectively also about an exfoliation band electrical potential difference. Moreover, there is no effect by the polyether ester amide also about a dynamics property, and the surface-protection film which has sufficient mechanical strength was able to be obtained.

[0038]

[Effect of the Invention] Since it is characterized by making said base material layer contain a

laminating of the binder layer to the base material layer which consists of synthetic resin according to the surface-protection film of this invention, a mechanical strength and transparency are high and can consider as the high surface-protection film of the antistatic effectiveness with little contamination of adherend.

[0039] Therefore, static electricity does not occur at the time of attachment of a protection surface film or exfoliation, but it can prevent that IC included in the circuit a liquid crystal panel and near the polarizing plate is destroyed by static electricity. Moreover, neither dust nor dust can adhere, but deterioration of commodity value can be prevented, and contamination by the bleed out of an antistatic agent can also be prevented. Furthermore, since transparency is high, stick [the surface-protection film], it is easy to process it, and an adherend front face can be inspected visually easily. Thus, if it is in this invention, the outstanding surface-protection film effective in storage can be offered at the time of processing and transport.

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TECHNICAL FIELD

[Field of the Invention] This invention relates to a surface-protection film. It is related with the surface-protection film of the removability which has the antistatic function in which it is specifically used at the time of processing of a liquid crystal panel, a polarizing plate, and a plastic resin plate, transport, or storage in order to protect these front faces.

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PRIOR ART

[Description of the Prior Art] In order to prevent adhesion of liquid crystal panels, such as a personal computer, and a word processor, an electronic calculator, and a blemish and the dust at the time of processing of a polarizing plate, contamination, etc., sticking a surface-protection film with the removability made of synthetic resin on a liquid crystal panel or a polarizing plate, and protecting it is performed.

[0003] However, since the conventional surface-protection film was produced from the synthetic resin which is an insulator, in case it exfoliates from a liquid crystal panel etc. after finishing the role to protect, static electricity occurs, consequently IC of an electronic circuitry is damaged, or it has the problem of dust and dust adhering, and needed to give the antistatic function to the surface-protection film.

[0004] Although the method of scouring antistatic agents, such as a conductive filler and a surfactant, was in the base material layer or binder layer which constitutes a surface-protection film as this one technique, what scoured the conductive filler had bad transparency, and it was difficult to check an adherend side visually, where a surface-protection film is stuck. Moreover, in order to acquire the target antistatic effectiveness, the conductive filler of a large quantity had to be added and it had led also to the rise of a large manufacturing cost.

[0005] Although the antistatic effectiveness was produced by an antistatic agent's, carrying out bleed out of what scoured antistatic agents, such as a surfactant, to the front face of a surface-protection film on the other hand, and missing static electricity from there, generally the surfactant had many things of low molecular weight, and since the amount of bleed out was not stabilized but the antistatic effectiveness and an adhesion property changed, it was difficult [it] to obtain the surface-protection film of fixed quality. When the amount of bleed out becomes superfluous especially, there is a fatal problem of polluting adherend with a surfactant.

[0006] The place which this invention is made in view of the fault of the above-stated conventional example, and is made into the object has high permeability, and is to offer the high surface-protection film of the antistatic effectiveness with little contamination of adherend.

[0007] Without the contained polyether ester amide having dropped out of the front face, and polluting adherend, without reducing the mechanical strength of a base material layer by making the base material layer which consists of synthetic resin contain a polyether ester amide, as a result of inquiring wholeheartedly that the above-mentioned technical problem should be solved, this invention person finds out that the surface-protection film excellent in the antistatic nature moreover stabilized can be obtained, and came to complete this invention.

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EFFECT OF THE INVENTION

[Effect of the Invention] Since it is characterized by making said base material layer contain a polyether ester amide in the surface-protection film of the removability which carried out the laminating of the binder layer to the base material layer which consists of synthetic resin according to the surface-protection film of this invention, a mechanical strength and transparency are high and can consider as the high surface-protection film of the antistatic effectiveness with little contamination of adherend.

[0039] Therefore, static electricity does not occur at the time of attachment of a protection surface film or exfoliation, but it can prevent that IC included in the circuit a liquid crystal panel and near the polarizing plate is destroyed by static electricity. Moreover, neither dust nor dust can adhere, but deterioration of commodity value can be prevented, and contamination by the bleed out of an antistatic agent can also be prevented. Furthermore, since transparency is high, stick [the surface-protection film], it is easy to process it, and an adherend front face can be inspected visually easily. Thus, if it is in this invention, the outstanding surface-protection film effective in storage can be offered at the time of processing and transport.

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MEANS

[Means for Solving the Problem] The surface-protection film concerning this invention is characterized by making said base material layer contain a polyether ester amide in the surface-protection film of the removability which carried out the laminating of the binder layer to the base material layer which consists of synthetic resin.

[0009] In this invention, a polyether ester amide is large, means the copolymerization product of the polyamide block which has a reactant end, and the polyether which has a reactant end, and means, not only the polymer formed of the random chain of a random polyether ester amide, i.e., various monomer components, but a block polyether ester amide, i.e., the polymer in which various kinds of components were formed by the block which has predetermined chain length.

[0010] As a polyether ester amide used for this invention, what was indicated by JP,1-163234,A, JP,4-5691,B, and JP,7-188476,A can be used, for example.

[0011] The polyether ester amide to which number average molecular weight is guided among these from the alkylene oxide addition product of the bisphenols of the polyamide of 200-5,000, the polyamide of the number average molecular weight 200-5,000 which the polyether ESUERU amide to which number average molecular weight is guided from the alkylene oxide addition product and/or polyoxy alkylene glycol of bisphenols of 300-5,000 is desirable, and has a carboxyl group especially in both ends, and number average molecular weight 300-5,000 is desirable.

[0012] The thermal resistance of a polyether ester amide worsens and less than 200 thing does not have the desirable number average molecular weight of a polyamide to production of a base material layer. On the other hand, that to which number average molecular weight exceeds 5,000 is difficult to obtain the polyether ester amide itself, and cannot obtain a surface-protection film cheaply. Moreover, the number average molecular weight of the alkylene oxide addition product of bisphenols or polyoxy alkylene glycol becomes what has the antistatic effectiveness inadequate [less than 300 thing]. On the other hand, that to which number average molecular weight exceeds 5,000 is difficult to obtain the polyether ester amide itself, and cannot obtain a surface-protection film cheaply.

[0013] As synthetic resin used for a base material layer, especially if used as a surface-protection film, it is not limited, and various synthetic resin, such as polyethylene, polypropylene, polyester, a polyvinyl chloride, a polyamide, ethylene/propylene copolymer, and polystyrene, is mentioned, for example, one sort or two sorts or more are used among these. Moreover, these layered products may be used if needed.

[0014] At this time, it is 5 - 50 weight section often [a polyether ester amide / mixing in the 1 - 100 weight section to the above-mentioned synthetic-resin 100 weight section], and more preferably. If it is the loadings of under 1 weight section, even if it can hardly acquire the antistatic effectiveness and blends mostly from the 100 weight sections, it is not enough, and the mechanical strength of antistatic effectiveness of the base material layer obtained does not improve, but is economically disadvantageous.

[0015] Although a base material layer makes these synthetic resin contain the above-mentioned polyether ester amide and is produced, it is the object which raises antistatic nature further, and in this base material layer contain the halogenated compound of alkali metal and/or

alkaline earth metal as occasion demands in addition to synthetic resin or a polyether ester amide. Moreover, the surfactant of various well-known nonionic one, anionic, cationicity, or both sexes is also mixable. Furthermore, the pigment which can respond in activity eye and can be made to add in the usual base material layer in addition to this, a color, a plasticizer, an antioxidant, an ultraviolet ray absorbent, a slipping agent, etc. may be added in the range in which the function as transparency or another antistatic nature and surface-protections film is not reduced.

[0016] In order to form a base material layer, synthetic resin and a polyether ester amide are mixed so that it may become the compounding ratio of the above-mentioned range, but after kneading beforehand with the approach of kneading synthetic resin and a polyether ester amide to a package, and producing a base material layer at this time, some synthetic resin, and a polyether ester amide, there is an approach called the so-called masterbatch or master pellet which kneads the remaining synthetic resin. It is desirable to go via a masterbatch or a master pellet generally from a viewpoint which can mix a polyether ester amide to homogeneity. As this masterbatch or a master pellet, it is supplied as a trade name "PERESUTATTO series" from Sanyo Chemical Industries, Ltd., for example. That is, this masterbatch (master pellet) and the synthetic resin which forms a base material layer can be mixed so that it may become the above-mentioned mixing ratio, and a sheet-like base material layer can be obtained with a conventional method. Moreover, as mentioned above, even if it uses a different thing from the remaining synthetic resin mixed with the synthetic resin used for this masterbatch or a master pellet, it does not interfere.

[0017] The binder used for the surface-protection film of this invention will not be especially limited, if it has the property which there are no stiffness and contamination of a paste in the panel side of a liquid crystal panel etc., and can adhere to it possible [re-exfoliation]. For example, various binders, such as acrylic, a natural rubber system, a synthetic-rubber system, an ethylene-vinylacetate copolymer system, an ethylene-acrylic ester system, a styrene-isoprene block-copolymer system, and a styrene-butadiene block-copolymer system, are mentioned, and these one sort or two sorts or more can be used.

[0018] Although it is not limited especially as an approach of carrying out the laminating of the binder layer to a base material layer but the approach of arbitration is adopted, corona discharge treatment can be carried out to one side of a base material layer, and the above-mentioned binder solution can be applied, for example. Moreover, into a binder solution, the various additives used into various kinds of antistatic agents, a slipping agent, and the binder of an antioxidant and others usual surface-protection film can be added if needed.

[0019] Moreover, in the surface-protection film of this invention, although the thickness of a base material layer and a binder layer is suitably determined by the application, respectively, generally 10-100 micrometers of thickness of a base material layer are 30-70 micrometers preferably. Moreover, generally 1-50 micrometers of thickness of a binder layer are 3-15 micrometers preferably.

[Translation done.]

* NOTICES *

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

EXAMPLE

[Example] Next, various production of the surface-protection film which is the example of this invention, and the surface-protection film which is an example of a comparison was carried out, and the effectiveness of this invention was checked. In addition, "%" and the "section" mean "% of the weight" and the "weight section" below, respectively. Moreover, this invention is not limited to each of these examples.

[0021] (Example 1) MFR (based on the flow test approach of a melt flow rate and JIS K7210 "thermoplastics".) It is below the same. After carrying out the dryblend of the master pellet (polyether ester amide content, Sanyo Chemical Industries [, Ltd.], Ltd. make, kneading lump antistatic-agent PERESUTATTO 2150 for polyethylene system resin) 30% containing 3.0 and consistency 70% of low density polyethylene and the polyether ester amide of 3 of 0.92g/cm, it extruded with the resin temperature of 190 degrees C with T form dice extruding press machine (40mmphi), and fabricated on the film with a thickness of 60 micrometers. The moldability was good and its appearance of the obtained film was also good.

[0022] Corona discharge treatment was performed to one side of the film obtained above, after applying the acrylic binder which comes to add tetraglycidyl ether -1 and the 3-bis-aminomethyl cyclohexane 3 section to the processing side to the copolymerization polymer 100 section of butyl acrylate / acrylic-acid =95 / 5 (weight ratio) so that the spreading film may be set to 5 micrometers by solid content, 80 degrees C dried for 2 minutes with the oven, and the surface-protection film of an example 1 was obtained.

[0023] (Example 2) The surface-protection film of an example 2 was obtained by the bilayer co-extruding method by using as base material lamination resin mixture which carried out the dryblend of the master pellet 30% containing the polyether ester amide used in MFR3.0, and the consistency 70% of low density polyethylene and the example 1 of 3 of 0.92g/cm, using 11% content ethylene-vinylacetate copolymer of vinyl acetate of MFR4.0 and consistency 0.95 g/cm³ as binder lamination resin. In addition, the thickness of this thing was 60 micrometers and 45 micrometers and the binder layer thickness of base material layer thickness were 15 micrometers.

[0024] (Example 3) After carrying out the dryblend of MFR9.0, polypropylene 80% of consistency 0.90 g/cm³, and the master pellet (polyether ester amide content, Sanyo Chemical Industries [, Ltd.], Ltd. make, kneading lump antistatic-agent PERESUTATTO 3170 for polypropylene regins) 20% containing a polyether ester amide, it extruded with the resin temperature of 230 degrees C with T form dice extruding press machine (40mmphi), and fabricated on the film with a thickness of 40 micrometers. The moldability was good and its appearance of the obtained film was also good. Then, the laminating of the binder layer was carried out like the example 1, and the surface-protection film of an example 3 was obtained.

[0025] (Example 4) After carrying out the dryblend of the master pellet 20% containing the polyether ester amide used in MFR9.0, and the consistency 10% of low density polyethylene and the example 3 of polypropylene 70% of 3, MFR3.0, and consistency 0.92 g/cm³ of 0.90g/cm, it extruded with the resin temperature of 230 degrees C with T form dice extruding press machine (40mmphi), and fabricated on the film with a thickness of 40 micrometers. The moldability was good and its appearance of the obtained film was also good. Then the laminating of the binder

layer was carried out like the example 1, and the surface-protection film of an example 4 was obtained.

[0026] (Example 1 of a comparison) After carrying out the dryblend of 90% of low density polyethylene and 10% (Sanyo Chemical Industries, Ltd. KEMISUTATTO 1100) of nonionic surface active agent mold antistatic agents of MFR3.0 and consistency 0.92 g/cm³, it extruded with the resin temperature of 190 degrees C with T form dice extruding press machine (40mmphi), and fabricated on the film with a thickness of 60 micrometers. Although the moldability was good, some smeariness was seen on the film front face. Then, the laminating of the binder layer was similarly carried out like the example 1, and the surface-protection film of the example 1 of a comparison was obtained.

[0027] (Example 2 of a comparison) The low density polyethylene of MFR3.0 and consistency 0.92 g/cm³ was extruded with the resin temperature of 190 degrees C with T form dice extruding press machine (40mmphi), and was fabricated on the film with a thickness of 60 micrometers. Then, the laminating of the binder layer was similarly carried out like the example 1, and the surface-protection film of the example 2 of a comparison was obtained.

[0028] (Example 3 of a comparison) The low density polyethylene of MFR9.0 and consistency 0.92 g/cm³ was extruded with the resin temperature of 230 degrees C with T form dice extruding press machine (40mmphi), and was fabricated on the film with a thickness of 40 micrometers. Then, the laminating of the binder layer was similarly carried out like the example 1, and the surface-protection film of the example 3 of a comparison was obtained.

[0029] [Characteristic test] Each following trial was performed about each surface-protection film of the examples 1-4 acquired above and the examples 1-3 of a comparison. As a characteristic test, it measured about adhesion, an appearance, the stain resistance to adherend, the electrical property (surface resistivity, exfoliation band electrical potential difference), and the dynamics property (an elastic modulus, breaking strength).

[0030] (Adhesion) Each surface-protection film was cut into 20mm width of face, the acrylic resin plate (it is the same the "bitter taste rewrite L" by Mitsubishi Rayon [Co., Ltd.] Co., Ltd. and the following.) was made to carry out 1 **** of the rollers of 2kgf(s), they were stuck on it, and it measured with the tension tester after 30 minutes on a part for speed-of-testing/of 300mm, and conditions with an exfoliation include angle of 180 degrees.

[0031] (Appearance) It evaluated whether about a surface-protection film, there would be a film of the examples 2 and 3 of a comparison with which an antistatic agent is scoured, and a big difference. Without spoiling transparency, when there was no smeariness of the front face by the bleed out of an antistatic agent, it considered as O, and when there was smeariness of the front face by coloring of a film or the bleed out of an antistatic agent, it evaluated as x.

[0032] (Stain resistance to adherend) Each surface-protection film was cut into 20mm width of face, and the acrylic resin plate was made to carry out 1 **** of the rollers of 2kgf(s), it stuck, and viewing estimated [whether there is any contamination in the acrylic resin plate made to exfoliate by the hand and] after 50 degrees C and 24-hour preservation. When there was no contamination in an acrylic resin plate, it considered as O, and when there was contamination, it evaluated as x.

[0033] (Electrical property)

** Surface resistivity JIS According to the regular approach, it measured [to K6911 "the thermosetting plastic commercial-test approach"] about a base material layer front face and each binder layer front face under the ambient atmosphere of 25 degrees C and 65% [of humidity] R.H.

** The surface-protection film which stuck each surface-protection film on the front face of the polarization film for liquid crystal displays stuck on the acrylic resin plate of exfoliation band electrical-potential-difference 70mmx100mm magnitude, and was stuck after that was made to exfoliate by hand, and the electrification potential then charged on the polarization film concerned was measured under the ambient atmosphere of 25 degrees C and 65% [of humidity] R.H. with the current collection type potential measuring instrument (KS[by the Kasuga electrical-and-electric-equipment company]-471 mold).

The surface-protection film was cut into 20mm width of face, and the tension test was performed using the tension test machine by part for distance [of 50mm] between chucks, and speed-of-testing/of 300mm.

** It asked from the inclination of the tangent in early stages of the stress-strain curve by the elastic-modulus above-mentioned tension test.

** It asked from the reinforcement at the time of the film fracture by the breaking strength above-mentioned tension test.

[0035] The result of each above-mentioned characteristic test was summarized in a table 1.

[0036]

[A table 1]

	粘着力 (gf/20mm)	外 観	被着体 への 汚染性	電 気 特 性			力 学 特 性	
				表 面 抵 抗 率		剥離帯電圧 (kV)	弾 性 率 (kgf/mm ²)	破 断 強 度 (kgf/mm ²)
				フィルム面 (Ω/□)	糊 面 (Ω/□)			
実施例 1	50	○	○	3×10^{11}	3×10^{11}	-2.0	16	2.0
実施例 2	5	○	○	1×10^{11}	2×10^{10}	-2.0	15	2.1
実施例 3	45	○	○	7×10^{10}	3×10^{11}	-2.0	65	3.9
実施例 4	40	○	○	4×10^{11}	7×10^{10}	-1.5	55	3.2
比較例 1	30	×	×	1×10^{11}	1×10^{11}	-2.5	15	2.0
比較例 2	50	○	○	5×10^{10}	3×10^{10}	-8.5	17	2.1
比較例 3	5	○	○	5×10^{10}	2×10^{10}	-7.5	12	1.8

[0037] As shown also in a table 1, each surface-protection film of an example of transparency or an appearance was also good, and did not have the contamination to adherend, either. Moreover, although it was low with the surface-protection sheet of an example 2 also about adhesion, about the adhesiveness on actual, it was satisfactory, and there was no effect by the polyether ester amide which the base material layer was made to contain. Furthermore, surface resistivity was able to be reduced more than it like [electrical characteristics] the case where a surfactant is made to knead, and it was able to be made to fall effectively also about an exfoliation band electrical potential difference. Moreover, there is no effect by the polyether ester amide also about a dynamics property, and the surface-protection film which has sufficient mechanical strength was able to be obtained.

[Translation done.]